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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/910,090	07/20/2001	Mehryar Mohri	2001-0226A	2371

7590 11/05/2004

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EXAMINER	
WOZNIAK, JAMES S	

ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 11/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/910,090	MOHRI, MEHRYAR	
	Examiner	Art Unit	
	James S. Wozniak	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *2/11/2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *30-55* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *30-55* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 July 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/1/2001*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. **Claims 30-55** are provisionally rejected under the judicially created doctrine of double patenting over claims 1-38 of copending Application No. 09/910,093. This is a

provisional double patenting rejection since the conflicting claims have not yet been patented.

The subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows: a method for epsilon removal in a finite state transducer comprising the computation an ε-closure for each state of a transducer and the modification of outgoing transitions by removing each transition labeled with an empty string and adding to each transition leaving a non-empty-string transition, wherein each state "q" is left with its weights pre- multiplied by an ε-distance from state "p" to a state "q" in an automaton.

Furthermore, there is no apparent reason why applicant would be prevented from presenting claims corresponding to those of the instant application in the other copending application. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

Drawings

3. Figures 1, 2, and 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action

to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action.

The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. **Claims 46-49 and 50-53** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In this case the aforementioned claims only recite an abstract idea for removing epsilon transitions in a transducer or automaton, which are abstract machines consisting of a set of states. Thus, Claims 46-49 and 50-53 contain non-statutory subject matter.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. **Claims 30, 32- 34, 36-38, 40-42, 44, 45, 54, 55** are rejected under 35 U.S.C. 102(b) as being anticipated by Mohri et al (*"A Rational Design for a Weighted Finite-State Transducer Library," 1998)*.

With respect to **Claim 30**, Mohri discloses:

Computing an ε-closure for each state "p" of the automaton A *(Page 7, Section 2.1)*;

Modifying outgoing transitions of each state "p" by:

Removing each transition labeled with an empty string *(Fig. 5, and Page 7, Section 2.1)*; and

Adding to each transition leaving "p" a non-empty-string transition, wherein each state "q" is left with its weights pre-x-multiplied by an ε-distance from state "p" to a state "q" in the automaton A *(weight update, Pages 6-8, Section 2.1)*.

Also the method disclosed by Mohri is implemented using a computer program *(Page 10)*, which would inherently require program storage on a computer readable medium.

With respect to **Claim 32**, Mohri recites:

Leaving q with the weights (d[p,q] x w[e]) to the transitions leaving p *(weight update, Pages 6-8, Section 2, and Fig. 5)*.

With respect to **Claim 33**, Mohri discloses:

Removing all transitions not labeled with an empty string from automaton A to produce an automaton A_ε *(extracting non-ε transitions, Page 7, Section 2.1)*;

Decomposing A_ε into its strongly connected components *(shortest distance pairs from source to destination, Pages 6-8, Section 2)*; and

Computing all-pairs shortest distances in each component visited in reverse topological order *(backwards extension of a non-ε transition, Pages 6-8, Section 2)*.

Claim 34 contains subject matter similar to Claim 30, and thus, is rejected for the same reasons. Also, Mohri discloses method implementation in a speech recognition system (Pages 1-2, Section 1.1), which would inherently require some type of speech processing circuitry.

Claims 36-37 contain subject matter similar to Claims 32-33, and thus, are rejected for the same reasons.

Claim 38 contains subject matter similar to Claim 30, and thus, is rejected for the same reasons.

Claims 40-41 contain subject matter similar to Claims 32-33, and thus, are rejected for the same reasons.

Claim 42 contains subject matter similar to Claim 34, and thus, is rejected for the same reasons.

Claims 44-45 contain subject matter similar to Claims 32-33, and thus, are rejected for the same reasons.

Claim 54 contains subject matter similar to Claim 30, and thus, is rejected for the same reasons.

Claim 55 contains subject matter similar to Claim 38, and thus, is rejected for the same reasons.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. **Claims 31, 35, 39, and 43** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohri et al.

With respect to **Claims 31, 35, 39, and 43**, Mohri teaches the method and circuit for epsilon removal as applied to Claims 30 and 34. Although Mohri does not specifically suggest removing inaccessible states according to a depth first search, the examiner takes official notice that it would have been obvious to do so since a depth first search is a well known and easily implemented (using readily available computer applications) means of reducing automata size for more efficient language processing by eliminating zero probability states in a lattice. Thus, in order to implement a readily available method of automata reduction, it would have been obvious to one of ordinary skill in the art, at the time of invention, to modify the teachings Mohri with a depth first search.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Sproat et al *(U.S. Patent: 5,806,032)*- discloses a method for obtaining a weighted finite state transducer.
- Morley et al *(U.S. Patent: 6,499,132)*- discloses a method for removing an epsilon node from a hierarchical tree.
- Kempe *(U.S. Patent: 6,760,636)*- teaches a method of epsilon removal by concatenating output symbols of a finite state transducer.
- Weng et al *("Efficient Lattice Generation and Representation," 1998)*- teaches the use of a backward reduction algorithm with a finite state transducer.
- Van Noord et al (*"Treatment of Epsilon Moves in Subset Construction," 2000)*- discloses a method for epsilon closure computation and epsilon removal, including inaccessible states.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (703) 305-8669 and email is James.Wozniak@uspto.gov. The examiner can normally be reached on Mondays-Fridays, 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached at (703) 305-4827. The fax/phone number for the Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center receptionist whose telephone number is (703) 306-0377.

James S. Wozniak
11/1/2004

SUSAN MCFADDEN
PRIMARY EXAMINER